

ALEX (LINYI) GAO

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EMPLOYMENT

Stanford University Assistant Professor of Biochemistry	<i>2022 – present</i>
Harvard Society of Fellows Junior Fellow	<i>2021 – 2022</i>
Broad Institute of MIT and Harvard Postdoctoral Fellow	<i>2020 – 2021</i>

EDUCATION

Massachusetts Institute of Technology Ph.D. Biological Engineering GPA 5.0/5.0	<i>September 2020</i>
Stanford University M.S. Electrical Engineering GPA 4.0/4.0	<i>June 2014</i>
Stanford University B.S. Chemistry; Minor in Mathematics Graduated with Distinction GPA 4.05/4.00	<i>June 2013</i>

HONORS AND AWARDS

Siebel Scholar, 2019
Wishnok Prize (MIT BE), 2017
S.S. & I.M.F. Marsden Memorial Prize in Chemistry (Stanford), 2013
President's Award for Academic Excellence in the Freshman Year, 2010
Raytheon STEM Study Award, 2010
U.S. Presidential Scholar, 2009
National Merit Scholar, 2009

PUBLICATIONS

15. **Gao LA**^{*†}, Wilkinson ME^{*}, Strecker J^{*}, Makarova KS, Macrae RK, Koonin EV, Zhang F[†]. Prokaryotic innate immunity through pattern recognition of conserved viral proteins. *Science* **377**, eabm4096 (2022) (*co-first author) (†corresponding author) (Highlighted in: [Quanta Magazine](#), [Cell Host & Microbe](#), [Trends in Microbiology](#), [Nature Reviews Immunology](#), [MIT News](#))
14. Mestre MR^{*}, **Gao LA**^{*}, Shah SA, López-Beltrán A, González-Delgado A, Martínez-Abarca F, Iranzo J, Redrejo M, Zhang F, Toro N. UG/Abi: A highly diverse family of prokaryotic reverse transcriptases associated with defense functions. *Nucleic Acids Res*, gkac467 (2022) (*co-first author)

13. Gao R*, Yu CC*, **Gao L**, Piatkevich KD, Neve RL, Upadhyayula S, Boyden ES. A highly homogeneous polymer composed of tetrahedron-like monomers for high-isotropy expansion microscopy. *Nat Nanotechnol* **16**, 698–707 (2021) (Highlighted in: [GEN](#), [MIT News](#))
12. **Gao L**, Altae-Tran H, Böhning F, Makarova KS, Segel M, Schmid-Burgk JL, Koob J, Wolf YI, Koonin EV, Zhang F. Diverse enzymatic activities mediate antiviral immunity in prokaryotes. *Science* **369**, 1077–1084 (2020)
11. Altae-Tran H*, **Gao L***, Strecker J, Macrae RK, Zhang F. Computational identification of repeat-containing proteins and systems. *QRB Discovery* **1**: e10, 1–12 (2020) (*co-first author)
10. Schmid-Burgk JL*, **Gao L***, Li D*, Gardner Z, Strecker J, Lash B, Zhang F. Highly parallel profiling of Cas9 variant specificity. *Mol Cell* **78**, 794–800 (2020) (*co-first author)
9. Makarova KS, **Gao L**, Zhang F, Koonin EV. Unexpected connections between type VI-B CRISPR-Cas systems, bacterial natural competence, ubiquitin signaling network and DNA modification through a distinct family of membrane proteins. *FEMS Microbiol Lett* **366**, fnz088 (2019)
8. Strecker JS, Jones S, Koopal B, Schmid-Burgk J, Zetsche B, **Gao L**, Makarova KS, Koonin EV, Zhang F. Engineering of CRISPR-Cas12b for human genome editing. *Nat Commun* **10**, 212 (2019)
7. Nishimasu H, Shi X, Ishiguro S, **Gao L**, Hirano S, Okazaki S, Noda T, Abudayyeh OA, Gootenberg JS, Mori H, Oura S, Holmes B, Tanaka M, Seki M, Hirano H, Aburatani H, Ishitani R, Ikawa M, Yachie N, Zhang F, Nureki O. Engineered CRISPR-Cas9 nuclease with expanded targeting space. *Science* **361**, 1259–1262 (2018)
6. Tekin H, Simmons S, Cummings B, **Gao L**, Adiconis X, Hession CC, Ghoshal A, Dionne D, Choudhury SR, Yesilyurt V, Sanjana NE, Shi X, Lu C, Heidenreich M, Pan JQ, Levin JZ, Zhang F. Effects of 3D culturing conditions on the transcriptomic profile of stem-cell-derived neurons. *Nat Biomed Eng* **2**, 540–554 (2018)
5. **Gao L**, Cox DBT, Yan WX, Manteiga JC, Schneider MW, Yamano T, Nishimasu H, Nureki O, Crosetto N, Zhang F. Engineered Cpf1 variants with altered PAM specificities. *Nat Biotechnol* **35**, 789–792 (2017)
4. Nishimasu H*, Yamano T*, **Gao L**, Zhang F, Ishitani R, Nureki O. Structural basis for the altered PAM recognition by engineered CRISPR-Cpf1. *Mol Cell* **67**, 139–147 (2017)
3. Yan WX*, Mirzazadeh R*, Garnerone S, Scott DA, Schneider MW, Kallas T, Custodio J, Wernersson E, Li Y, **Gao L**, Fedorova Y, Zetsche B, Zhang F, Bienko M, Crosetto N. BLISS is a versatile and quantitative method for genome-wide profiling of DNA double-strand breaks. *Nat Commun* **8**, 15058 (2017)
2. Tillberg PW*, Chen F*, Piatkevich KD, Zhao Y, Yu CC, English BP, **Gao L**, Martorell A, Suk H, Yoshida F, DeGennaro E, Roossien DH, Desimone R, Cai D, Boyden ES. Expansion microscopy of biological specimens with protein retention. *Nat Biotechnol* **34**, 987–992 (2016)
1. Slaymaker IM*, **Gao L***, Zetsche B, Scott DA, Yan WX, Zhang F. Rationally engineered Cas9 nucleases with improved specificity. *Science* **351**, 84–88 (2016) (*co-first author) (Highlighted in: [BBC Health](#), [Phys.org](#), [Nature](#), [Nature Biotechnology](#), [MIT News](#))

PATENTS

Gao L, Li D, Schmid-Burgk J, Zhang F. Novel Cas enzymes and methods of profiling specificity and activity. Serial no. PCT/US2021/021973

Gao L, Nety S, Schmid-Burgk JL, Zhang F. Bacterial defense systems and methods of identifying thereof. US provisional application no. Serial no. 17/085,937

Altae-Tran H, Gao L, Zhang F. Target recognition motifs and uses thereof. Serial no. 16/937,286

Cox D, Gao L, Slaymaker I, Zetsche B, Zhang F. Novel CRISPR enzymes and systems. Serial no. PCT/US2017/028420

Fedorova I, Gao L, Koonin E, Li Y, Makarova K, Nishimasu H, Nureki O, Slaymaker I, Yamano T, Zetsche B, Zhang F. Crystal structure of CRISPR Cpf1. Serial no. PCT/US2017/014568

Gao L, Slaymaker I, Zetsche B, Zhang F. CRISPR enzyme mutations reducing off-target effects. Serial no. PCT/US2016/038034

INVITED PRESENTATIONS

Rising Stars Seminars, Princeton Bioengineering Initiative, 2021 (Princeton, NJ)

Genome Engineering 7.0 Workshop, 2019 (Cambridge, MA)

Genome Engineering 6.0 Workshop, 2018 (Cambridge, MA)

Novel Technologies in Neuroscience Symposium, 2018 (Lund, Sweden)

Genome Engineering and Synthetic Biology Conference, 3rd Edition, 2018 (Brugge, Belgium)

CRISPR International Conference, 2017 (Big Sky, MT)

Genome Engineering 5.0 Workshop, 2017 (Cambridge, MA)

MIT Synthetic Biology Symposium, 2017 (Cambridge, MA)

Cystic Fibrosis Foundation New Technologies Conference, 2016 (Savannah, GA)

LEADERSHIP/SERVICE

Mentored five PhD rotation students, one master's student, and one research associate *2016–2020*

Co-president, MIT Graduate Christian Fellowship *2016–2017*

Student officer, MIT Sidney-Pacific Graduate Residence
(organized social events and managed reimbursements) *2015–2017*

Teaching assistant, 20.110 (MIT) – Thermodynamics of Biomolecular Systems *Fall 2016*

Teaching assistant, Stanford Sophomore College *Aug.–Sep. 2013*

Volunteer, VA Hospital at Menlo Park, CA *2012–2014*